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ABSTRACT

A report is given of the development and implementation of a training manual for eighth-grade mathematics teachers in the Netherlands. The manual is research-based on process-product correlations of effective classroom practices. To test the effectiveness of a 6-hour training period using the manual, nine experienced mathematics teachers were observed with the same class for six lessons before the training. Following their participation in training with the manual over an 8-week period, the teachers were observed again. The focus of the obsrevations was on classroom management and instruction. It was concluded that the training and the training manual can change teacher behavior. Tables present comparisons in behaviors before and after using the training manual. (JD)

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The implementation of a research based teacher training

Peter van der Sijde

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The implementation of a research based teacher training

Report to interested IEA General Assembly Members,
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Introduction

The objective of the translation phase in the Classroom Environment Study is to develop a research-based training for teachers on basis of process-product correlations (Research Proposal Classroom Environment Study).
In the Dutch correlational study 50 teachers (specialist mathematics teachers in the 8th grade) participated. This sample of 50 teachers was found to be representative for the population of mathematics teachers. The overall results were not used to develop the planned training as the decision was taken to concentrate on teachers using the same textbook (There are three different textbooks in The Netherlands). The overall results of effective classroom practices are reported by Tomic (1985) and given in Table 1.

Table 1
Effective classroom practices in the Dutch CES (source: Tomic, 1985)

	Beta-weight for the cognitive outcomes	*Beta-weight for the affective outcomes*
Higher-order question to group	.15	
Probe followed by correct answer	.17	
Teacher waits after posing a question	.12	
Redirecting a question succesfully	.17	
All kinds of positive feedback	.25	.19
All explaination by the teacher		.13
Listening to the teacher		.26
Discussing homework, assigment etc.		.26

We decided to select one of the three major textbooks on mathematics to develop a training for (Sigma). In the correlational study there were 17 teachers using Sigma and the major results for this textbook are in Table 2. Krammer (1984) found that certain teacher behavior is elicited by the textbook he is using
The correlations mentioned in Table 2 are more interesting, but not enough to base our training upon. For instance, management behavior correlates negatively with cognitive as well as affective learning outcomes. Management of the classroom, however, is very important. Nevertheless these findings do not give any clue on how to incorporate them in a training.

Table 2

Process-product correlations for textbook Sigma (n=17)

Cues	Affective outcomes	Cognitive outcomes
. Conducting a review of relevant concepts or asking students questions on relevant concepts	.35	.41
. Telling students exactly what to learn and what not to learn	.33	.14
. Giving concrete examples of abstract rules and concepts	.47	.24
. Clarify a definition with examples	.32	.10
Questions		
. Posing lower-order questions	.36	-.10
. Posing higher-order questions	.06	.40
. Redirecting a lower-order question	.42	-.08
. Lower-order question to the class	-.02	.40
. Higher-order question to the class	.02	.38
. Giving an effective probe	.33	.15
. Redirecting successfully	.48	.42
Feedback		
. All kinds of positive feedback	.51	.37
. All kinds of negative feedback	-.01	-.14
. Teacher answers a higher-order question himself	.06	-.15
. Teacher answers a question	-.15	-.32
. Teacher repeats the answer	.31	.57
Management		
. Control and discipline	-.09	-.54
. Non-academic interactions in the classroom	-.25	-.56
. Teacher busy with management	-.26	-.69
. Discipline remark to the class	-.19	-.59
. Discipline remark to a student	-.06	-.53
Time engaged in instruction and other task-oriented activities	.17	.65

To design our training we used three sources:

- our own correlational study (results mentioned above);
- similar studies;
- theoretical and empirial studies.

Design of the training

There is very few literature on the design of research-based trainings. The publication of Crawford and Gage (1977) is an exception. Crawford and Gage describe their training in 5 components:

1. An introduction and general overview of the training course;
2. Behavior management and classroom discipline strategies;
3. Instructional methods;
4. Questioning and feedback strategies;
5. A summary and review of all the recommendations.

To design our training we adopted this division into 5 components.
In the training, stress is laid upon time-management. Analogous to the lesson stage model of Good and Grouws (1979) we developed a model for our specific purpose - see Table 3.

Table 3.
Lesson stage model

		time available for each phase
phase 1	*review of homework*	*5 à 10 min.*
phase 2	*development of (new) concepts*	*10 à 15 min.*
phase 3	*seatwork: practice with (new) concepts*	*5 min.*
phase 4	*classroom discussion: solving a specific problem of an assigment*	*10 min.*
phase 5	*homework and extra help to students who need this*	*10 min.*

Application of the lesson stage model is hypothesized to improve specific aspects of classroom management. Kounin and Gump (1974) reported that there has to be a continuous stream of activities (signal) and no abrupt changes, and Arlin (1979) reports that during changes the off-task behavior is twice as high as during other activities in the classroom. The lesson stage model is a

time-management model for the teacher, a model to prepare and conduct his lessons.
The training program we developed has 5 components:

1. An introduction and general overview of the training course;
2. The lesson stage model;
3. Classroom management;
4. Instruction and the lesson stage model;
5. A summary and a review.

Complementary to the training session a manual is developed. In the manual the 5 components of the training are recognizable.

Variables to be trained on

As mentioned in the introduction three sources have been used to design our training.
The first source contains our own correlational study, in Table 4 below the variables from the correlational study are mentioned as well as the way they are incorporated in the training manual.

The second source contains similar studies, i.e. studies conducted according to the descriptive-correlational-experimental loopdesign (Rosenshine and Furst, 1978).
As described in the former session we used the Good and Grouws study to develop an analogous lesson stage model and the Crawford and Gage study as a model for the design of the training.
The third source is theoretical and empirical studies which are not conducted according to the descriptive-correlational-experimental loopdesign. These variables are in Table 5.

Table 4

Variables in the correlational study and the way they are incorporated in the training manual

Variables from the correlational study	*Variables in the training manual*
Give a review of relevant concepts or ask questions on relevant concepts	*Give a review of relevant concepts*
	Brush up prerequisites
Give concrete examples of abstract rules and concepts	*Use examples*
Clarify a definition with examples	*Indicate what is important and what is not important*
Indicate what is important to learn and what is not important to learn	
Pose lower-order questions	*Pose lower-order questions*
Pose higher-order questions	*Pose higher-order questions*
Redirect questions succesfully	*Do not redirect a questions more than once, take care it is answered succesfully*
Give succesful probes	*Do not give more than one probe take care it is answered succesfully*
Give positive feedback	*Give positive feedback*

Table 5

Theoretical and empirical studies as a source for training variables

theoretical and empirical studies	*training*
there must be a continuous signal	*take care there is a continuous signal*
be withit	*be withit*
alert the class	*alert the class*
let students be accountable for what goes on in the classroom	*let the students be accountable for what goes on in the classroom*
give a summary at the end of development	*give a summary at the end of development*

Observation of teacher behaviors

The observation instrument which are developed for the correlational phase of the CES by Gage and Needles is not suitable for this phase of the study. As it appeared from previous sections a number of the categories of teacher behavior are added and a number have been left out, so our categories do not match the categories in the observation system developed by Gage and Needles.

For this reason a new observation system, TOOL-W, has been developed. This was also an opportunity to make some major improvements in the process of making data available for processing. It was decided to implement TOOL-W on a small portable computer (Canon X-07).

In this way the data are recorded by the observers on the computer. The data are cleaned on impossible combinations of observation categories and these clean data are transfered to a mainframe computer for further processing (in SPSS).

TOOL-W consists out of four different groups of observation codes:

1: direction of look of the teacher;

2: lesson phase (according to the lesson phase model);

3: classroom management behavior;

4. instructional behavior.

In Table 6 these four groups of observation codes are related to the content of the training.

Table 6

Relation between the o beervation categories in TOOL-W and the variables in the training manual

TOOL-W	Manual
Direction of look (class, blackboard, paper, elsewhere)	
Management	withitness
t. changes place	
t. rebukes a student	
t. looks at a student	
t. lets student describe what he is supposed to do	
break	continuous signal
t. gives pay-attention signal	group alerting
t. gives turns	
t. asks for progress	student accountability
Lesson stages	lesson stage model
stage 1	
stage 2	
stage 3	
stage 4	
stage 5	brushing up prerequisites
stage 6	
Instruction	
t. conducts a review	review of relevant concept
t. uses examples	use of examples
t. refers to textbook	indicate what is important and what is not important
t. indicates what is important and what not	
t. gives summary	give a summary
t. poses a lower-order question	pose lower-order question
t. poses a higher order question	pose higher order question
t. gives a probe	give succesful probes
t. redirects a question	redirect questions succesfully
t. gives feedback "good"	give positive feedback
t. gives feedback "good" and repeats answer	
t. gives feedback "wrong"	
t. gives feedback "wrong" and answers the question himself	

Teacher training course

The teacher training course is a course of approximately 6 hours. During this period the manual (40 pages) is explained and discussed with the teachers. The first three hours are spent on the first three components of the training and the second three hours on the last two components. Part of the last component is an idividual preparation of a lesson according to the lesson stage model. Immediately afterwards the various designs are discussed with the participants. All teacher receive the 40 page manual to study carefully at home and practice the advice in actual lessons.

Implementation of the training

To study the effects of a short training an experiment was carried out.

Subjects: Nine mathematics teachers using the textbook Sigma in the 8th grade participated voluntarily in this experiment. Originally there were 10 subjects, but during the experiment one teacher got ill and his data were excluded from the analysis. All teachers were male and their mean experience was 11.3 years (standard deviation: 6.2).

Design: A one group pretest-posttest design was used.

Procedure: Six graduate students (in Education and Science) were trained for about 40 hours to master the observation instrument TOOL-W.
After the observer training the 9 mathematics teachers were observed with the same class for six lessons*. From each lesson five periods of five minutes were intensively observed. Every five seconds the managerial and instructional behavior was registered. After the observation of six lessons the teacher were received at our institute to participate in the training.
This training lasted about 6 hours and attention was paid to classroom management and instruction.
After the training in an eight-week period six lessons were observed again.

* This statement holds for 6 of the 9 teachers, the other 3 joined later in the experiment and of them only three lessons are observed in this phase of the experiment.

Results

Interobserver agreement

The collected data have to be reliable. To test the agreement between the observers, we had on several occasions a lesson observed by two observers. The interobserver agreement has been calculated by means of a correlation between the summed observation category of each of the five periods in the lessons. The correlation coefficients are presented for two complex categories, classroom management and instruction, in Table 7, and Table 8.

Table 7

Interobseveragreement: instruction

	observer					
	1	2	3	4	5	6
1	-					
2	.9848	-				
3	.8507	.9415	-			
4	.9552	.8590	.9947	-		
5	.2194	.6693	.9708	.9015	-	
6	.9874	.9778	-	-	-	-

Table 8

Interobserver agreement: management

	observer					
	1	2	3	4	5	6
1	-					
2	.8480	-				
3	.9540	.9742	-			
4	.7728	.5634	.9738	-		
5	.1420	-.1479	.8673	.9952	-	
6	.9738	.9558	-	-	-	-

Lesson schedule

In Table 9 the time the average teacher engaged in each phase in the lesson is mentioned. The time for each phase is estimated by generalizing the observed part of a lesson to the complete lesson.

Table 9

Time engaged in lesson phases

	advised	*before training*	*after training*	*t*	*p*
review of homework	*5 to 10 min.*	*22.4 min.*	*16.6 min.*	*1.54*	*.10*
development	*10 to 15 min.*	*5.4 min.*	*8.4 min.*	*2.37*	*.05*
seatwork: practice	*5 min.*	*3.4 min.*	*7.2 min.*	*1.53*	*.10*
classroom discussion	*10 min.*	*2.2 min.*	*4.4 min.*	*1.64*	*.10*
homework and individual help	*10 min.*	*4.8 min.*	*6.4 min.*	*0.45*	*n.s.*

Classroom management

Classroom management is divided into two types of management:

- prevention of classroom disturbances
- restoration of classroom disturbance

It appeared that the effectsize of the training (E)* for is prevention : E = 0.67, and for restoration : E = 0.42.

With reference to the prevention, five teachers did implement this behavior with an increase of one standard deviation, two teachers did not implement it, one of them because of a ceiling-effect, two showed a less than one standard deviation increase (see Table 10).

* Effectsize of the training is calculated after Bloom (1984) as E = (Xa - Xp)/Sp. In this formula E = effectsize of the training, Xa = the mean of the observed behavior after the training, Xp = the mean of the observed behavior prior to the training and Sp = the standard deviation of Xp. The effectsize is positive in case the observed change in behavior is in the desired direction.

Table 10

Prevention of classroom disturbances

	before the training	*after the training*	
teacher 1	*4.40*	*7.83*	*(+ 1 Sp)*
2	*6.85*	*2.38*	
3	*4.30*	*6.12*	
4	*3.60*	*7.82*	*(+ 1 Sp)*
5	*3.47*	*7.06*	*(+ 1 Sp)*
6	*4.69*	*5.80*	
7	*10.93*	*10.70*	
8	*4.47*	*7.17*	*(+ 1 Sp)*
9	*2.13*	*5.30*	*(+ 1 Sp)*

Xp = 4.98

Sp = 2.56

On the restoration-of-classroom-disturbances behavior only one teacher showed a decrease of this behavior of at least one standard deviation. Four teachers showed a decrease of less than one standard deviation and three showed the same behavior. One teacher showed a slight increase.

Instruction

Instruction is divided into three components:

- development (explanation)
- questions
- feedback

. development (explanation)

Teachers have been trained to use four type of cues. These cues are mentioned in a previous section. In Table 11 an overview of the effectsizes of these cues is given.

Table 11
Effectsizes of the cues

Cues	*E*
Conduction a review of relevant terms and concepts	*-0.06*
Asking question on relevant terms and concepts	*0.33*
Using examples	*3.50*
References to the textbook	*-0.08*
Indicating important and unimportant contents	*0.00*
Giving a summary to end the development	*-0.03*

Further we also notices an increase of higher-order questions during development (E = 0.38).

. Questions

Teachers used after the training more higher-order * questions (E = 1.13) and less lower order questions (E = -0.35). More probes are given (E = 0.47) and less questions are redirected (E = -0.17). Further there is a decrease on giving more than one probe (E = 0.46) after a lower-order question.
On the use of higher-order questions six of the teachers showed an increased use of them with at least one standard deviation, two remained the same and one showed a decrease.

. Feedback

Feedback is devided into positive and negative feedback. The effectsize of positive feedback is E = 0.17, and of negative feedback E = 0.31.

Discussion

From the data on the use of time spent in a lesson stage it appears that the training causes a change. Though all changes are in the right (advised) direction, one of the lesson stages takes more time as advised. Seatwork (practice with new concepts) took before the training ± 3.4 minutes and after the training ± 7.2 minutes (the advice was 5 minutes). Maybe 5 minutes for

* Lower-order and higher-order questions refer to the taxonomy of Bloom. Lower-order questions are questions on knowledge and concepts, higher-order questions are questions on application, analysis, synthesis and evaluation.

this stage is too short. Overall there is an increase of effective time on task as far as it concerns the teachers with approximantely 5 minutes, this means from 38 minutes to 43 minutes. One lesson last maximally 50 minutes and part of it is the change of classroom for the next lesson. This means that on the average there is an enormous increase.

Although the teachers participating in our experiment were very experienced (mean 11.3 years) they apparently were able and willing to implement the proposed behavior on classroom management, especially the behavior concerned with the prevention of classroom disturbances (withitness). The reason why the restoration of classroom disturbances was not implemented is because this is behavior elicited by the students. Before and after the training the same classroom with the same students were observed and after all the students were not trained. Nevertheless an effect on the management behavior of the teachers is noticable. The criterion we use for implementation is an increase of at least one standard deviation of the mean scores of the teachers.

The use of examples has an enormous effectsize, e.g. Walberg (1984) mentions in his meta-analysis of research "reinforcement" as having the greatest effectsize, which is E = 1.17. Teachers do not conduct more reviews after the training than before, but during "development" they ask more questions, lower-order questions (questions on prerequisites) as well as higher-order questions.
On the whole teachers pose less lower order questions and more higher order questions. In the manual stress was laid on using lower-order questions during lesson stage "seatwork: practice" and during "development", and on using higherorder questions during the classroom discussion. This part of the data has not been analysed so far.
Finally we observed an increase of positive feedback ('feedback "good"' and 'feedback "good" teacher repeats answer') and a decrease of negative feedback ('feedback "wrong"' and "feedback "wrong" and teacher answers the question himself').

Our conclusion derived from this first experiment is that the training and training manual can establish the proposed changes in teacher behavior. An interesting point is that the teachers in our experiment were no novice-teachers nevertheless effects of the training are distinctable. There is no

indication to change the content of our training drastically, because most of the behavior can be implemented.

Our plan for the near future is to conduct an other experiment. One group of teachers (n = 15) will receive the training and the training manual, while a second group of teachers (n = 15) will serve as a control group. The growth scores of the students of the teachers in the experimental group are compared with those of students in the control group. The experiment will take place in the september-december period of this year (1985).

Literature

Arlin, M. (1979) Teacher transitions can disrupt time flow in classrooms. American Educational Research Journal, 16, 42-56

Bloom, B.S. (1984) The search for methods of group instruction as effective as one-to-one tutoring. Educational Leadership, 41, 4-17.

Crawford, J. and Gage, N.L. (1977) Development of a research-based teacher training program. California Journal of Teacher Education, 4, 105-123.

Good, T.L. and Grouws, D. (1979) The Missouri mathematics effectiveness project: an experimental study in the fourth grade. Journal of Educational Psychology, 71, 355-362.

IEA (n.y.) Research proposal: Classroom environment study: teaching for learning.

Kounin, J.S. and Gump, P.V. (1974) Signal systems of lesson settings and task-realted behavior of preschool children. Journal of Educational Psychology, 66, 554-562.

Krammer, H.P.M. (1984) Leraar en leerboek [Teacher and textbook]. Harlingen, Flevodruk.

Rosenshine, B. and Furst, N. (1978) The use of direct observation to the study of teaching. In Travers (ed), Second handbook of research on teaching. Chicago: Rand McNally.

Tomic, W. (1985) Docentgedrag en leerresultaat [Teacher behavior and learning outcome]. Enschede, dissertatie TH Twente.

Walberg, H.J. (1984) Improving the productivity of America's schools. Educational leadership, 41, 1927.